

# MOSES PRASAD VARGHESE

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## EDUCATION

**Master of Science in Mechanical Engineering (Data Science)** | University of Washington Seattle, WA | June 2023

- Relevant coursework: Software Development for Data Scientists, Data Science and Materials Informatics, Natural Language Processing, Database Management Systems, Reinforcement Learning, Deep Learning, Computer Vision, Applied Parallel Computing, Control Systems
- GPA: 3.85/4.00

**Bachelor of Technology in Mechanical Engineering** | National Institute of Technology Rourkela, India | June 2018

- Relevant coursework: Data Structures and Algorithms, C and C++ programming, Advanced Mechatronics, Computer Graphics, Basic Electronics and Electrical Engineering, Electrical Machines
- CGPA: 8.33/10.00

## PUBLICATION

Anwesa Mohanty, **Moses Prasad Varghese**, Rabindra Kumar Behera, "Coupled nonlinear behavior of beam with a moving mass", Applied Acoustics, Volume 156, 2019, pp. 367–377

## SKILLS

- Programming: Python, C/C++, SQL/NoSQL, MATLAB, C#
- Tools: Linux, Git, Docker, Kubernetes, Tableau, PySpark, Databricks, Azure, Apache Spark
- Frameworks: PyTorch, TensorFlow, FastAPI, NLTK, LangChain, Vertex AI, OpenCV, Keras, Scikit-learn, Streamlit, NumPy, Pandas, Seaborn, Matplotlib, CUDA, Numba, Open Source

## RESEARCH PROJECTS

**Machine Learning Intern** | Chubb Insurance, Jersey City, New Jersey (remote) | September 2022 - March 2023

- Performed data extraction on unstructured documents classified using the Azure Form Recognizer
- Developed post-processing algorithms with regular expressions to refine information extraction
- Trained customized AI models using Azure Doc AI, achieving 80% accuracy in entity detection
- Achieved 3/30 rank on an automated data capture tool project with Azure AI Entity Extraction and Kubernetes
- Analyzed PyOD research paper and developed an outlier detection predictive algorithm for real-time anomaly document classifier by probabilistic unsupervised learning

**Database Development Lead** | Institute for Health Metrics and Evaluation, Seattle, WA | June 2022 - August 2022

- Led a team in database design and management for a high-priority project
- Developed an Entity Relationship (ER) System to optimize the existing database structure and efficiency
- Identified architectural issues based on the ERD to improve database performance with faster read/write

**Deep Learning Project** | University of Washington Seattle, WA | April 2022 - June 2022

- Conducted research study on approximation, optimization, generalization theory, deep reinforcement learning, neural network architectures, transformers, and unsupervised learning techniques
- Analyzed "Long-Term Visual Dynamics with Region Proposal Interaction Networks" to advance understanding of visual dynamics and interaction models
- Investigated representation learning and physical reasoning in images using Convolution Interaction Networks

**Computer Vision Project** | University of Washington Seattle, WA | April 2022 - June 2022

- Conducted research study on image transformations, resizing, filtering, convolutional operations, interest operators, object detection and motion/optical flow
- Analyzed the paper on "Global Association Network for Lane Detection" using ResNet architecture
- Developed a ResNeXt model with self-attention, replacing ResNet, achieving a 94% F1 score

**Applied Parallel Computing Project** | University of Washington Seattle, WA | April 2022 - June 2022

- Conducted research study on GPU resource utilization and parallelization using CUDA programming
- Developed an algorithm for Stereoscopic Depth Perception with 3 billion pixel calculations
- Parallelized computation with global memory, 2D grids, and 32 threads per block
- Achieved 85% accuracy and 147x faster performance over sequential algorithms

**Natural Language Processing Project** | University of Washington Seattle, WA | January 2022 - March 2022

- Conducted research study on language modeling, vector embeddings, semantic and linguistic structure prediction, and sequence-to-sequence models
- Analyzed the paper on aspect-based sentiment analysis (ABSA) using supervised contrastive learning model
- Investigated ABSA performance on new dataset and transformer encoder with BERT achieving 86% accuracy

**Data Science and Materials Informatics Project** | University of Washington Seattle, WA | Sept 2021 - Dec 2021

- Applied linear and multilinear regression models for material characteristic predictions with 82% accuracy
- Designed elbow and silhouette methods for optimal cluster prediction with 80% accuracy
- Implemented decision trees, SVM, and K-means clustering, to analyze large datasets of material properties
- Developed visualizations with Seaborn, Plotly, Altair and Matplotlib

**Student Researcher** | National Institute of Technology Rourkela, India | January 2017 - December 2019

- Analyzed nonlinear dynamics of a beam with a moving mass to assess its modal behavior
- Developed a geometric model incorporating nonlinearities and energy conversion
- Utilized Hamilton's principle, Galerkin discretization, and the Method of Multiple Scales for analysis
- Designed a MATLAB ODE solver for numerical analysis and simulation
- Achieved over 90% accuracy between analytical, numerical, and simulation results
- Published a research article in the Journal of Applied Acoustics

## EXPERIENCE

**Database and Student Programs Assistant** | FIUTS, Seattle, WA | August 2023 – August 2024

- Managed data operation automation in Salesforce using Process Builder, Flows, and integration features
- Facilitated student programs with DEI initiatives in education

**Machine Learning with Material Science Project** | University of Washington Seattle, WA | Jan 2023 – Mar 2023

- Developed and contributed to the open-source Python library *Solcore*, optimizing models for analyzing and visualizing data on solar cells and semiconductor materials
- Applied ML algorithms to extract insights and improve predictions of material properties and performance

**Database Application Development Project** | University of Washington Seattle, WA | Sept 2022 - Dec 2022

- Conducted study on query languages (SQL, Datalog), data models, database tuning and indexing, security, cloud databases (SQL Server on Azure, SQLite), transactions, and parallelism (MapReduce, Spark)
- Developed a command-line database application in Python (pymssql) for user management, scheduling, and inventory with Azure database integration

**Student IT Developer** | University of Washington Seattle, WA | August 2022 - September 2022

- Developed efficient documentation system for a C# and .NET codebase improving code clarity and accessibility
- Conducted research on code refactoring to enhance readability, maintainability, and overall performance

**Web Development Hackathon** | Morgan Stanley, Alpharetta, Georgia (remote) | March 2022 - April 2022

- Designed a web application using HTML, CSS, JavaScript, Python, Bootstrap, and Django framework
- Implemented key features including appointment scheduling and user profile setup and presented a demo

**Software Development for Data Scientist Project** | University of Washington Seattle, WA | Sept 2021 - Dec 2021

- Designed a real-time web dashboard using Streamlit in Python to display stock metrics with sentiment analysis
- Collected 1.6M+ data points from media posts focusing on sentiments and stock price data for specific tickers
- Developed a trading algorithm using VADER to generate trading indicators from social media sentiment
- Applied deep reinforcement learning to simulate buy/sell decisions based on trading signals and stock prices
- Achieved an average of 70% accuracy in model decision-making over one year of time series data